

**1 CLAIMS**

2 What is claimed is:

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4 1. A device for balanced high speed submarine gel electrophoresis, comprising:

5 a base, made liquid impermeable for holding buffer of electrophoresis, having a bottom in

6 substantially rectangular shape with a base length between two end walls and a base width

7 between two longitudinal walls, being accessible from top;

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9 a gel matrix, on top of said bottom around middle region, in a substantially rectangular shape with

10 a first gel end, a second gel end, and a plurality of sample wells in parallel with said first gel

11 end, being capable of resolving sample mixture into distinguishable bands under action of

12 an external power applied via connections of electrodes, connectors, and wires;

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14 a first piece, being capable of engaging with said two longitudinal walls and said gel matrix at a

15 first location adjacent to said first gel end and in parallel with said first gel end substantially;

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17 a second piece, being capable of engaging with said two longitudinal walls and said gel matrix at

18 a second location adjacent to said second gel end in parallel with said second gel end

19 substantially;

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21 a balancing chamber, defined by said first piece, said second piece, said two longitudinal walls,

22 and said gel matrix, minimizing inflow of said buffer over said gel matrix;

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24 a balancing liquid, held within said balancing chamber on top of said gel matrix, containing

25 conductive ions at user adjustable concentration, conducting electric current to generating

26 heat for temperature elevation and minimizing vertical temperature gradient of said gel

27 matrix;

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29 a cooling structure, having a thermal wall thick enough to slow down heat absorption, contacting

30 said balancing liquid for thermal communication, and

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32 a coolant, held inside said cooling structure and isolated from said balancing liquid, absorbing

33 heat from said balancing liquid and said gel matrix via said thermal wall.

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